VOLVO PENTA **TAD852VE 210kW/2200rpm**	Document No **22495854**	Issue Index **09**

Important

This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

Requirements marked with ⚠ are considered as critical for exhaust emissions compliance according to the design specification in the Volvo Penta application for certification.

Failing to follow and meet these instructions and requirements when installing a certified engine in a piece of nonroad equipment for use in the United States violates U.S. federal law (40 CFR 1068.105(b)), subject to fines or other penalities as described in the Clean Air Act.

General

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel

Number of cylinders			6
Displacement, total		liters in^3	7,70 470
Firing order			1-4-2-6-3-5
Bore		mm in	110 4,33
Stroke		mm in	135 5,31
Compression ratio			17.5:1
Wet weight (Not including after treatment system)	Engine only	kg lb	707 1559
	Power pac	kg lb	917 2022

Performance				**rpm**	**1500**	**1800**	**2000**	**2200**
IFN Power 210 kW		without fan		kW hp	192 261	210 286	210 286	210 286
		with fan 650 mm		kW hp	185 251	199 271	199 271	199 271
Torque at:		IFN Power 210 kW		Nm lbf ft	1225 903	1115 822	1003 739	912 672
Max torque at engine speed	IFN Power		1350 rpm	Nm lbf ft	1237 912			
Power tolerance				%	±5			
Mean piston speed				m/s ft/sec	6,8 22,1	8,1 26,6	9,0 29,5	9,9 32,5
Effective mean pressure at:		IFN Power 210 kW		MPa psi	2,00 289	1,82 264	1,64 237	1,49 216
Max combustion pressure at:		IFN Power 210 kW		MPa psi	13,1 1900	13,5 1958	13,3 1929	13,2 1914
Total mass moment of inertia, J (mR^2) (not including flywheel)				kgm^2 $lbft^2$	0,421 10,0			
Friction Power				kW hp	18 24	25 34	31 42	38 52
Derating see Technical Diagrams								

Engine brake performance (only engines with engine brake)		**rpm**	**1500**	**1800**	**2200**	**2500**
Brake power:	without fan	kW hp	36 49	53 72	83 113	107 146
Brake torque:	without fan	Nm lbf ft	230 170	280 207	360 266	410 302
Engine speed range for engine brake activation:		rpm	900-2500			
Min engine speed with engine brake still active:		rpm	750			
Min oil temperature for engine brake activation:		°C	N/A			

Cold start performance

*Cold start limit temperature	without starting aid	°C °F	-15 5	
	with manifold heater 4 kW	°C °F	-25 -13	
	with manifold heater 4 kW and block heater	°C °F	-35 -31	
*Specify oil quality	Above -15°C; 15W40 Above -25°C; 10W30 Below -25°C; 5W30			
Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	1,5		

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption (average)			Vol%	0,05
Oil system capacity including filters			liter US gal	27 7,13
Oil sump capacity:		Max	liter US gal	24 6,34
		Min	liter US gal	19 5,02
Oil change intervals/specifications	VDS3, VDS4.5		h	500
	VDS3 with oil analysis		h	1000
Engine angularity limits:		front up	°	35
		front down	°	35
		side tilt	°	35
Oil pressure at rated speed			kPa psi	425 62

Lubrication system

Lubrication oil temperature in sump:	max	°C °F	125 257
Oil filtration efficiency (in accordance with ISO 4548-12)	97%	µ	36
	50%	µ	14

Fuel system		**rpm**	**1500**	**1800**	**2000**	**2200**
Fuel to conform to			EU EN590 US D975, 1-D and 2-D (Max 3000ppm sulphur and 7% FAME) For further information, see service bulletin 18-8-8			
System supply flow at max. speed		liter/h US gal/h	165 43,6			
Fuel supply line max. restriction (Measured at fuel inlet connection)		kPa psi	10 1,5			
Fuel supply line max. pressure, during engine stand still (meassured at fuel inlet connection)		kPa psi	20 2,9			
System return flow at max. speed		liter/h US gal/h	111,0 29,3			
Fuel return line max. restriction (Measured at fuel return connection)		kPa psi	15 2,2			
Max. allowable inlet fuel temp (Measured at fuel inlet connection)		°C °F	80 176			
Prefilter / Water separator filtration efficiency	99%	µ	30			
Main fuel filter filtration efficiency (in accordance with ISO 19438)	98%	µ	5			
	96%	µ	4			
Governor type/make, standard		Volvo / EMS 2.3				
Injection pump type/make		Denso HP4				

Intake and exhaust system		**Inlet air temp**	**rpm**	**1500**	**1800**	**2000**	**2200**
Charge air consumption at: (+25°C and 100kPa)	IFN Power 210 kW	25°C	m³/min	14,5	17,5	18,6	20
		77°F	cfm	512	618	657	706
⚠ **See front page for important information** Max allowable air intake restriction including piping			kPa psi	6 0,9			
Heat rejection to exhaust at:	IFN Power 210 kW		kW BTU/min	174 9918	201 11436	206 11715	228 12960
Exhaust gas temperature after turbine at:	IFN Power 210 kW		°C °F	544 1011	524 975	510 950	522 972
⚠ **See front page for important information** Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 127 mm			kPa psi	8 1,2	12 1,7	14 2,0	15 2,2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power 210 kW		m³/min cfm	40,1 1416	45,4 1603	46,5 1642	50,3 1776

Cooling system			rpm	1500	1800	2000	2200
Heat rejection radiation from engine at:		IFN Power 210 kW	kW	10	10	9,4	10,3
			BTU/min	569	552	535	586
Heat rejection to coolant at:		IFN Power 210 kW	kW	93	102	104,2	119,4
			BTU/min	5260	5772	5926	6790
Radiator cooling system type				Closed circuit			
Standard radiator core area			m²	0,6			
			foot²	6,46			
Fan diameter	650 mm		mm	650			
			in	25,59			
Maximum fan power consumption	650 mm pull		kW	7,2	10,8	10,8	10,8
			hp	10	15	15	15
Fan drive ratio	fan Ø650			1:1.4			
	fan position high			1:1.1			
Coolant capacity:	engine		liter	17			
			US gal	4,5			
	engine + standard radiator, hoses and expansion tank		liter	51			
			US gal	13,5			
Coolant pump			drive/ratio	belt/1,4:1			
Coolant flow with standard system			l/s	5,4	6,5	7,2	8
			US gal/s	1,4	1,7	1,9	2,1
Minimum coolant flow			l/s				6,0
			US gal/s				1,6
Maximum outer circuit restriction incl. piping			kPa	40,0			
			psi	5,8			
Thermostat:		start to open	°C	85			
			°F	185			
		fully open	°C	95			
			°F	203			
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	110			
			psi	16,0			
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	85			
			psi	12,3			
Standard pressure cap setting			kPa	100			
			psi	14,5			
Maximum top tank temperature			°C	107			
			°F	225			
Recommended Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still are functioning			liter	2			
			US gal	0,5			

Charge air cooler system		rpm	1500	1800	2000	2200
Heat rejection to charge air cooler	IFN Power 210 kW	kW	38,2	45,9	48,4	54,4
		BTU/min	2172	2610	2752	3094
Charge air mass flow	IFN Power 210 kW	kg/s	0,288	0,348	0,37	0,398
Charge air inlet temp.	IFN Power 210 kW	°C	171	175	176	185
(Charge air temp after turbo compressor)		°F	340	347	349	365
⚠ **See front page for important information** Max allowable Charge air outlet temp.		°C	39	44	46	50
(Charge air temp after charge air cooler)		°F	102	111	115	122
⚠ **See front page for important information** Maximum pressure drop over charge air cooler incl. piping		kPa	7	9	10	12
		psi	1,0	1,3	1,5	1,7
Charge air pressure		kPa	189	196	187	187
(After charge air cooler)		psi	27,41	28,43	27,12	27,12
Standard charge air cooler core area		m²	0,5			
		foot²	5,38			

Cooling performance: 0,6 m² radiator and 650mm fan, pull

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

		IFN Power 210 kW					
Engine speed	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
2200	210	69,8	158	9,1	321,4	0	
	286	69,3	157	8,9	314,3	100	0,015
		68,5	155	8,6	303,7	200	0,029
		67,1	153	8,2	289,6	300	0,044

Cooling performance: 0,6 m² radiator and 650mm fan, push

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

		IFN Power 210 kW					
Engine speed	Engine power	*Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
2200	210	67,3	153	5,9	208,4	0	
	286	65,6	150	5,8	204,8	100	0,015
		63,7	147	5,7	201,3	200	0,029
		61,8	143	5,6	197,8	300	0,044

* AOT-temperatures are based upon simulations.

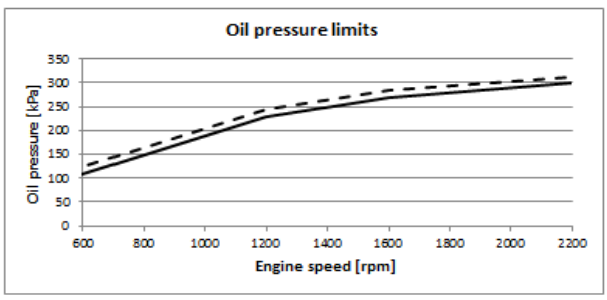
Engine management system

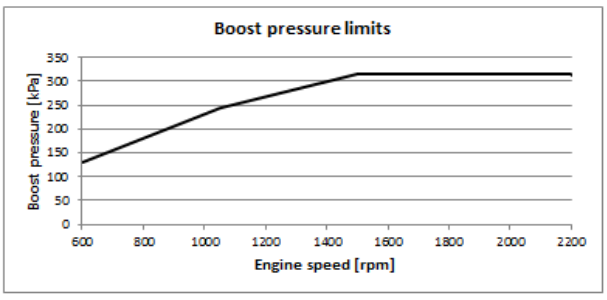
Functionality	Alternatives			Default setting
Governor mode	Droop	Isochronous		Isochronous
Governor droop	10	125	Nm/rpm	
Governor response	Adjustable PI constants			
Idle speed	600	800	rpm	600
Stop function				Replaced by "Ignition of stop engine"
Preheating function	Ignition	Request	Request + temp	If preheat is available, preheat will be active at ignition on if temp low or demanded by driver.
Lamp test				No lamp test, not used any longer
Ignition of stop engine	Yes	No		No

Engine sensors and switch settings		Alarm level			Engine protection	
Parameter		**Unit**	**Setting range**	**Default setting**	**Level**	**Action. Default/Alternative**
Oil temp		°C		125	125	Derate
Oil pressure	Low idle	kPa		100,0	100	Shut down
	Rated speed	kPa		300	300	Shut down
Coolant temp		°C		107	107	Derate
Coolant level				On	Low level	Derate
Water in fuel			On if closed circuit			
Air filter pressure drop				5kPa		
Altitude, above sea		m				Automatic derating, see section derating
Charge air temp		°C		80	80	Derate
Charge air pressure		kPa		See map		Derate
Engine speed		rpm				Shut down. ON/OFF*

* Off means no shut down, alarm only

Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after 0 sec	Forced shut down after 0 sec
Coolant temp	103°C	107°C	107°C	110°C		
Oil temp	122°C	125°C	125°C	130°C		
Low oil pressure	Warning map value	Alarm map value		Alarm map value		
High charge air temp	77°C	80°C	80°C	100°C		
High charge air pressure	Warning map value	Alarm map value	Alarm map value			





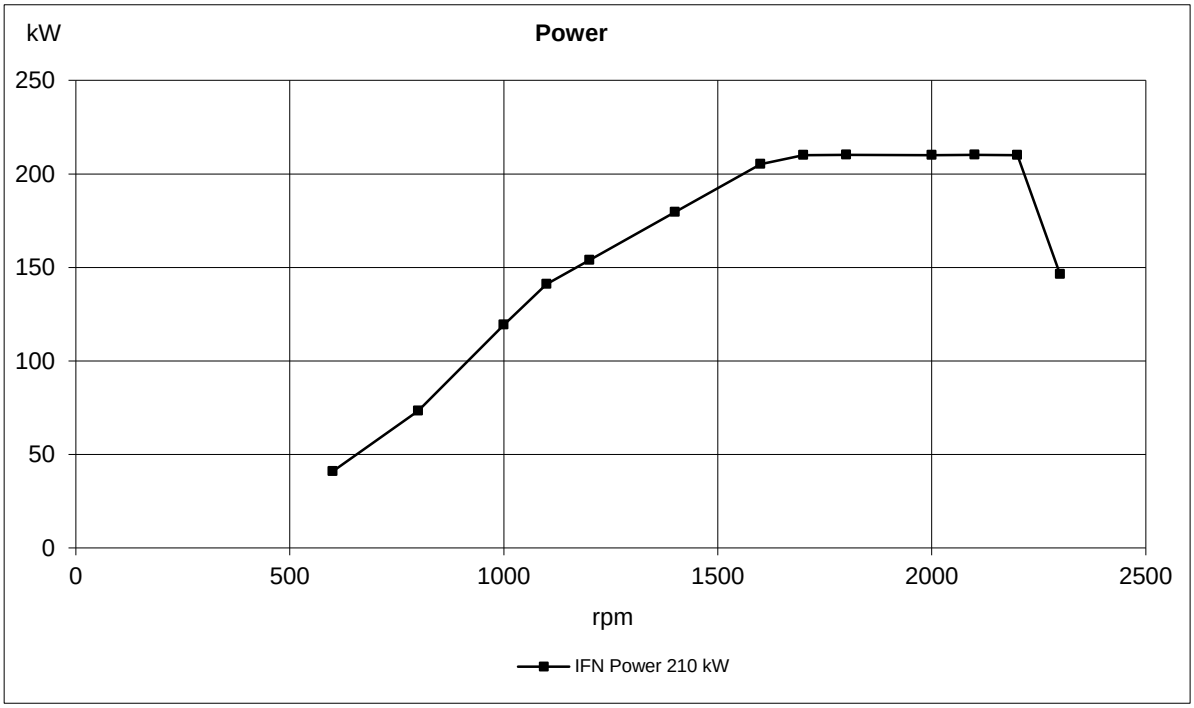
Electrical system

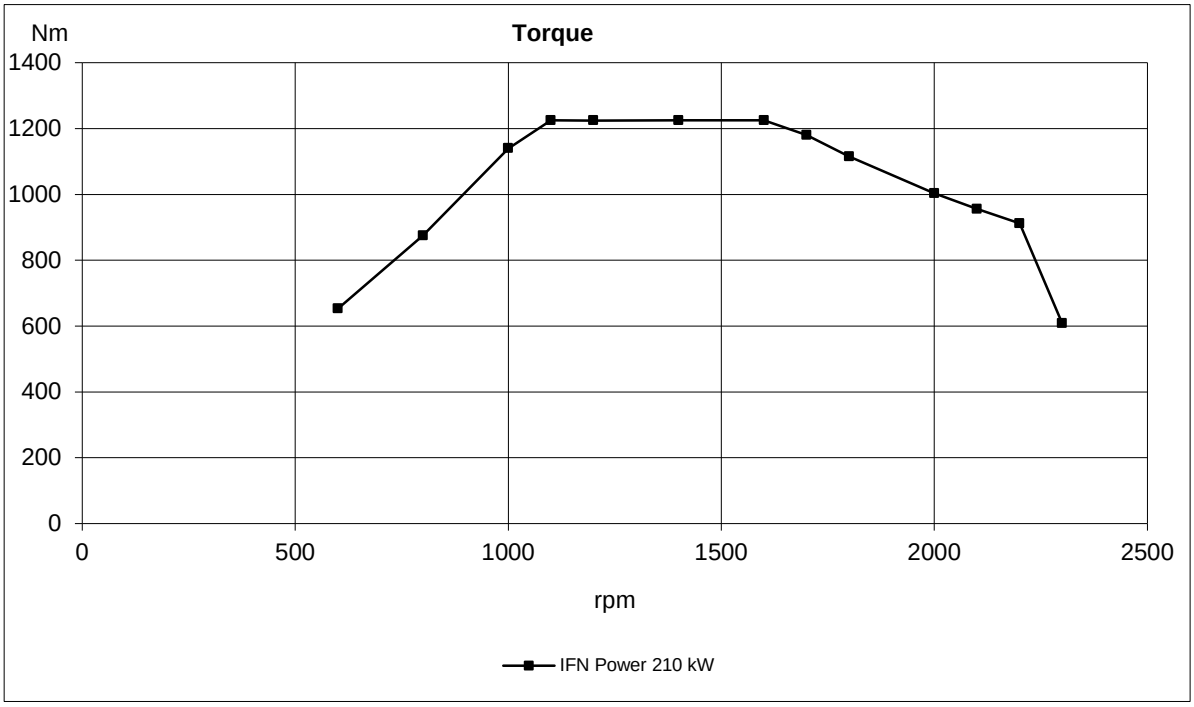
Voltage and type				24V
Alternator:	make			MELCO
	output	A		110/130
	tacho output	Hz/alternator rev.		
	drive ratio			
Starter motor:		make		MELCO
		type		85P50 / 90P55
		output	kW	5 / 5.5
			hp	6.8 / 7.5
Number of teeth on:		flywheel		137
		starter motor		10 / 12 teeth
Inlet manifold heater (at 20 V)			kW	4
Power relay for the manifold heater			A	200

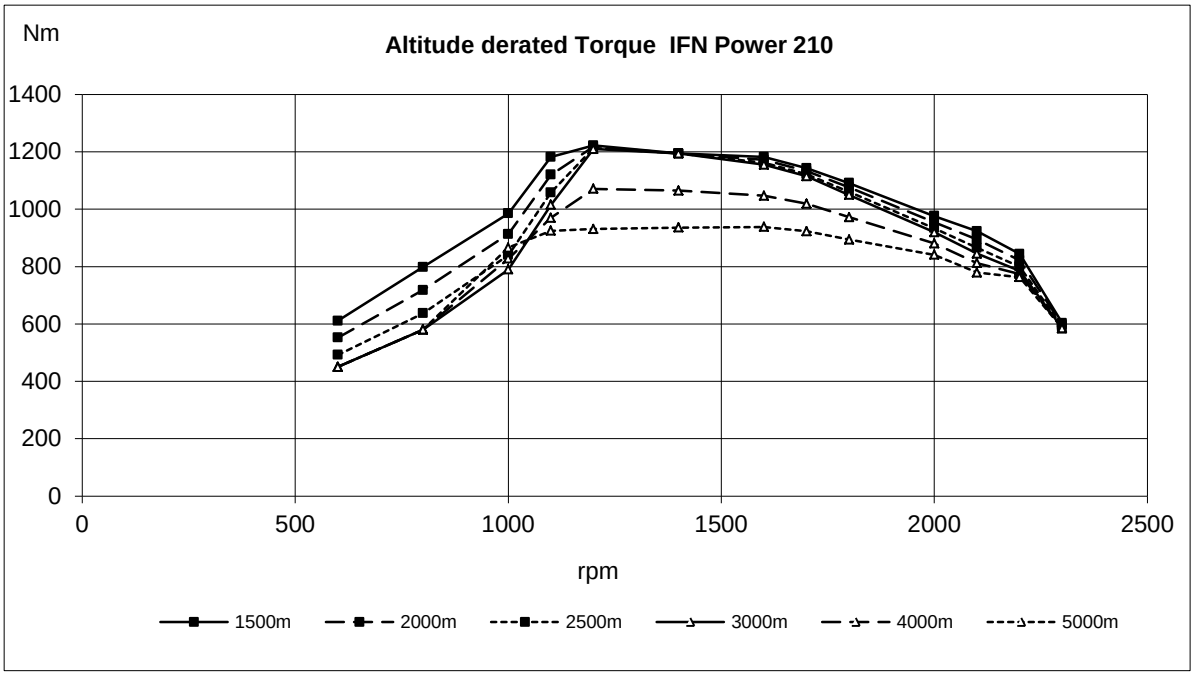
Conditions:	**Temperature**	**°C**		**25**	**0**	**-15**
(5 mΩ main circuit resistance@	**Battery**	**Ah / CCA**		**140/800**	**140/800**	**170/1000**
Crank speed		rpm		185	160	120
Crank current		A		220	300	470
Starter input power during crank		kW		4,91	5,90	6,94
Battery power during crank		kW		5,15	6,31	7,50
Min battery @ 0°C		Ah / CCA		100/700		

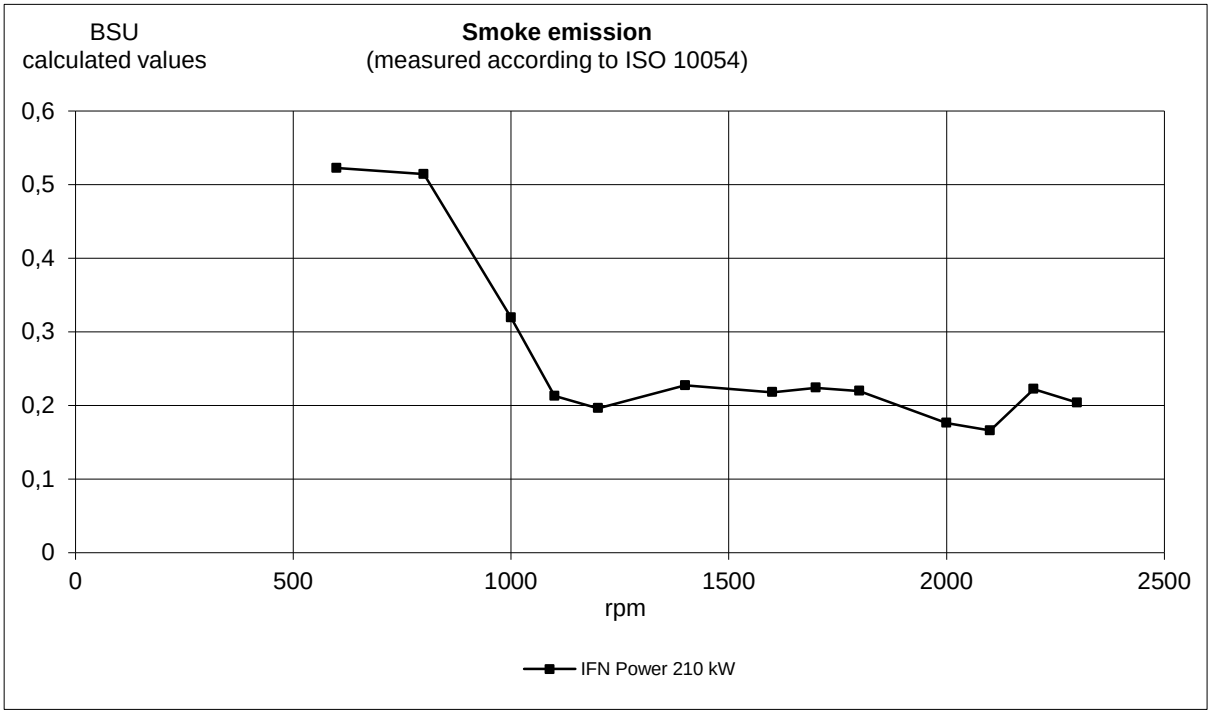
Power take off			**rpm**	**1500**	**1800**	**2000**	**2200**
Front end in line with crank shaft max:*		0.02 kgm^2	Nm	1064,0	743,0	740	833
Flywheel			lbf ft	785	548	546	614
SAE 2, STD 10" & 11,5 ", 1.303 kgm2		0.03 kgm^2	Nm	1030,0	706,0	697	786
			lbf ft	760	521	514	580
		0.04 kgm^2	Nm	996,0	663,0	654	729
			lbf ft	735	489	482	538
Front end belt pulley load.	Max up (above or equal to horizontal line)		kW	12,5	16	18,8	19,6
			hp	17,0	21,8	25,6	26,7
	Max down (below horizontal line)		kW	26,6	34,2	38	41,8
			hp	36,2	46,5	51,7	56,8
Maximum power on Rear PTO on top of flywheel housing(REPTO):*			kW	75			
			hp	102			
Speed ratio direction of rotation viewed from flywheel side				1:1 Counter clockwise			
Maximum torque on PTO at compressor position:*			Nm	200			
			lbf ft	148			
Speed ratio direction of rotation viewed from flywheel side				1.026:1 Counter clockwise			
Timing gear at hydraulic pump PTO max:*			Nm	80			
			lbf ft	59			
Speed ratio direction of rotation viewed from flywheel side				1.3:1 Clockwise			
Max allowed bending moment in flywheel housing SAE2			Nm	4600			
			lbf ft	3393			
Max. rear main bearing load			N				
			lbf				

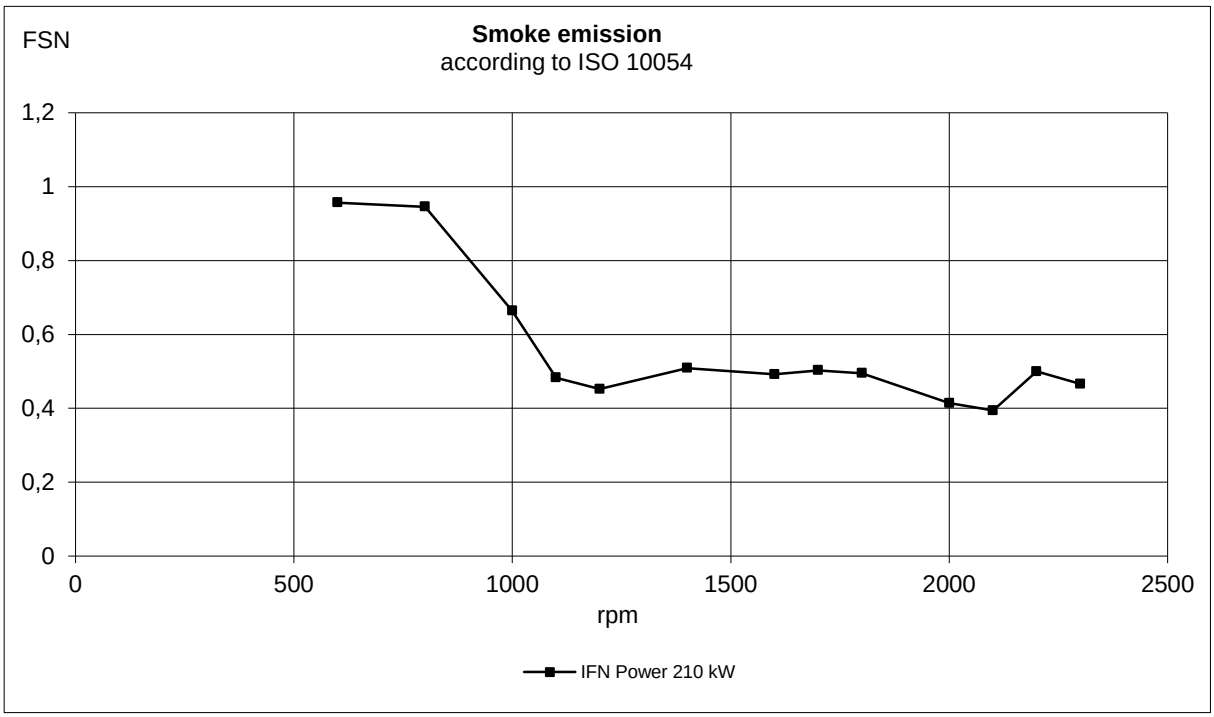
**** Maximum allowed torque at individual PTO´s.***
If more then one PTO output is used simultaniusly, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

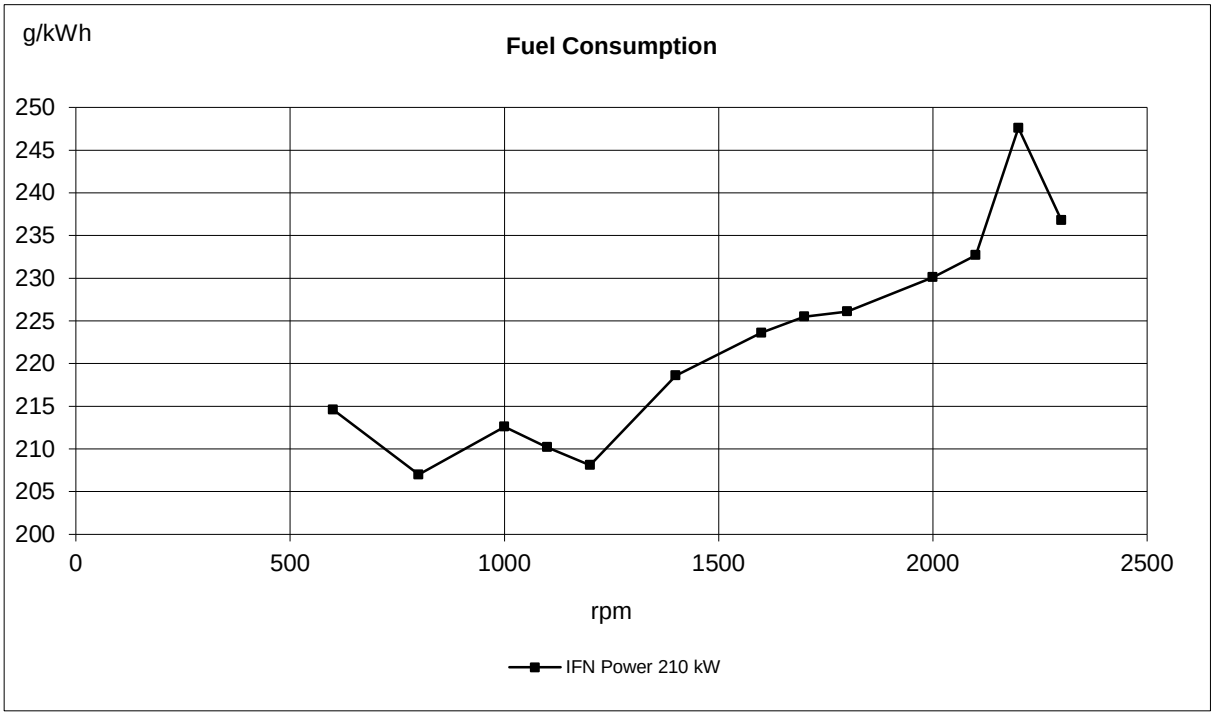

kW
Power
250
200
150
100
50
0
0
500
1000
1500
2000
2500
rpm
IFN Power 210 kW

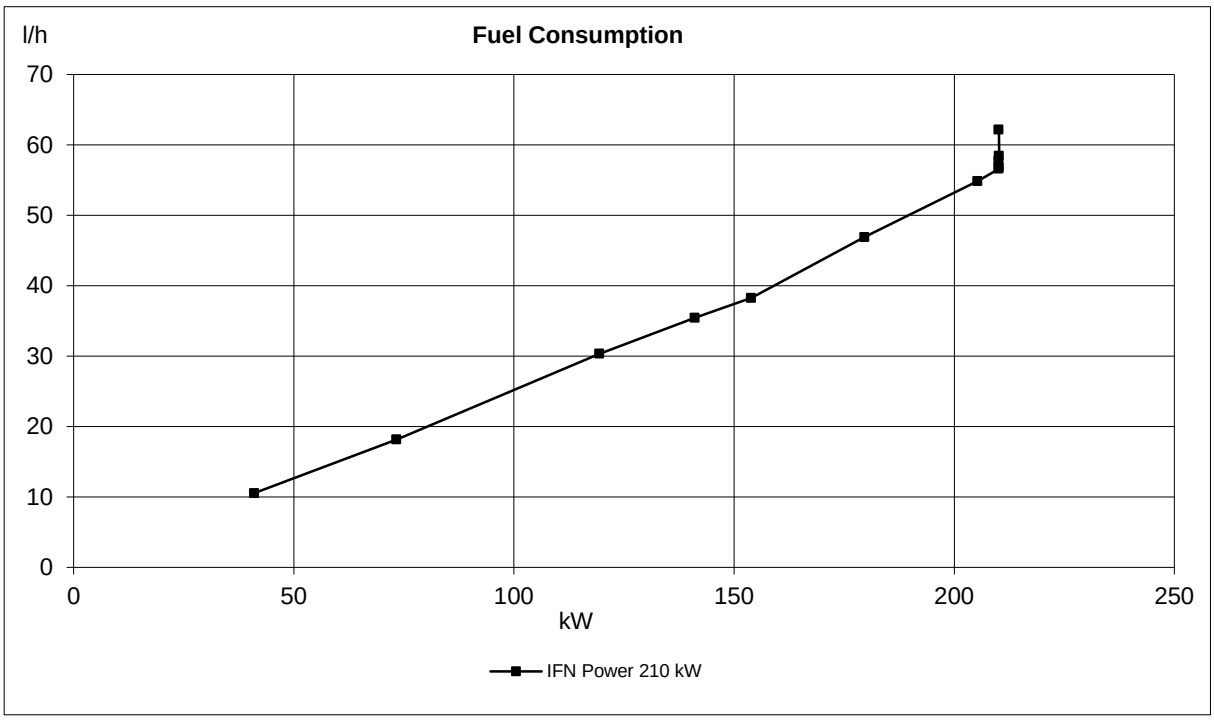

Nm
Torque
1400
1200
1000
800
600
400
200
0
0
500
1000
1500
2000
2500
rpm
IFN Power 210 kW

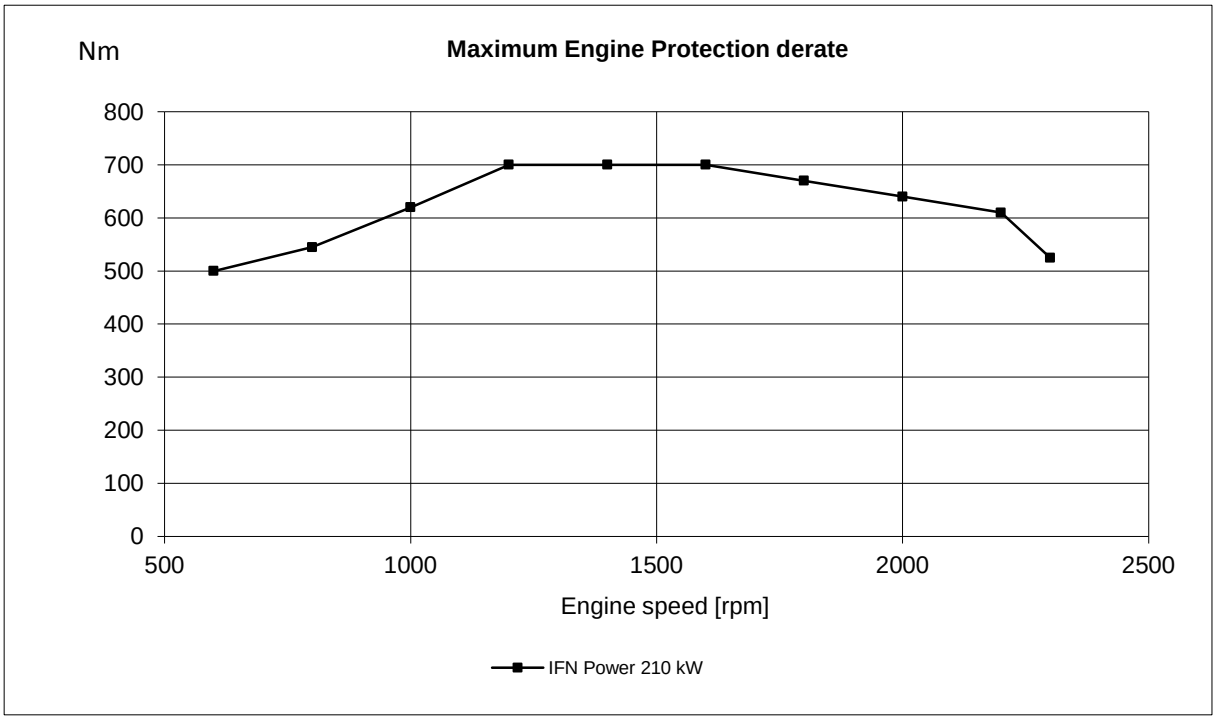

Nm
Altitude derated Torque IFN Power 210
1400
1200
1000
800
600
400
200
0
0
500
1000
1500
2000
2500
rpm
1500m
2000m
2500m
3000m
4000m
5000m

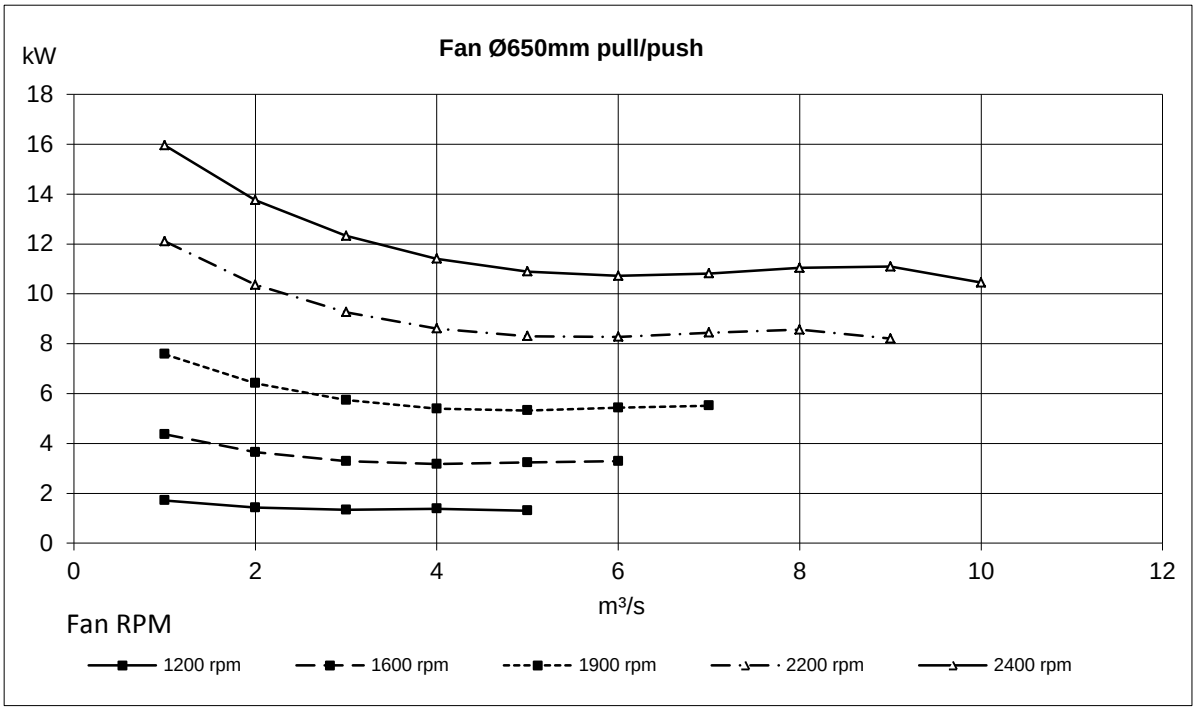

BSU
calculated values
Smoke emission
(measured according to ISO 10054)
0,6
0,5
0,4
0,3
0,2
0,1
0
0
500
1000
1500
2000
2500
rpm
IFN Power 210 kW


FSN
Smoke emission
according to ISO 10054
1,2
1
0,8
0,6
0,4
0,2
0
0
500
1000
1500
2000
2500
rpm
IFN Power 210 kW

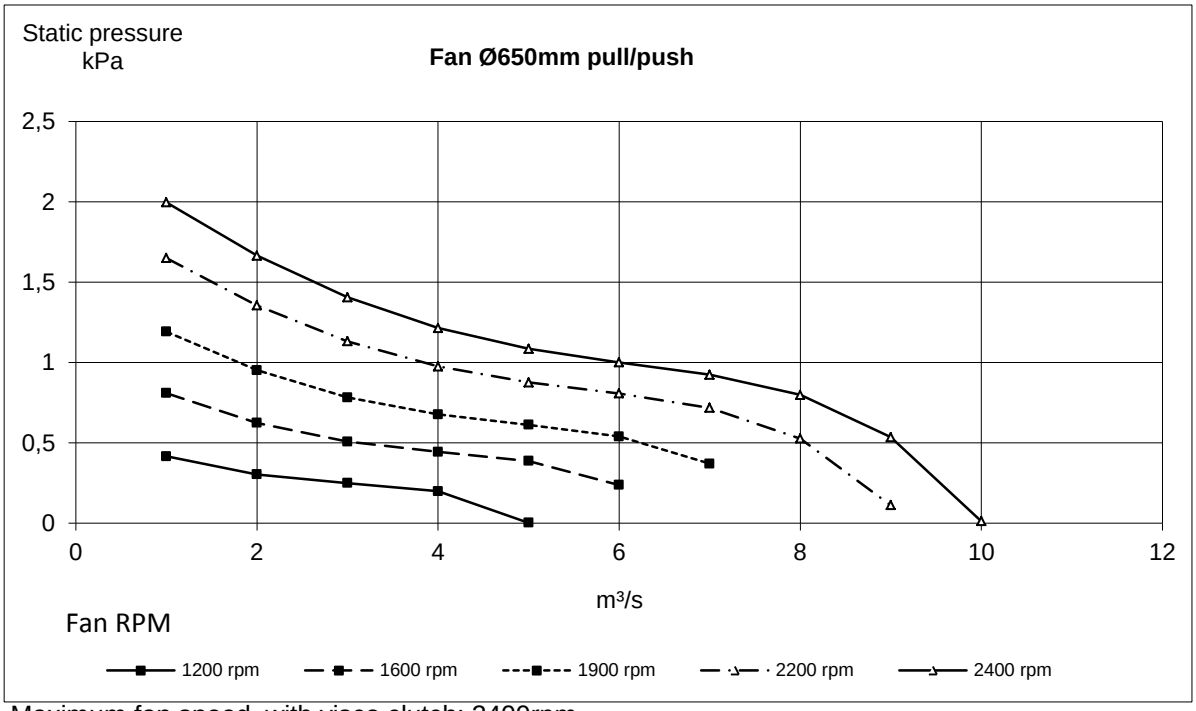

g/kWh
Fuel Consumption
250
245
240
235
230
225
220
215
210
205
200
0
500
1000
1500
2000
2500
rpm
IFN Power 210 kW


l/h
Fuel Consumption
70
60
50
40
30
20
10
0
0
50
100
150
200
250
kW
IFN Power 210 kW

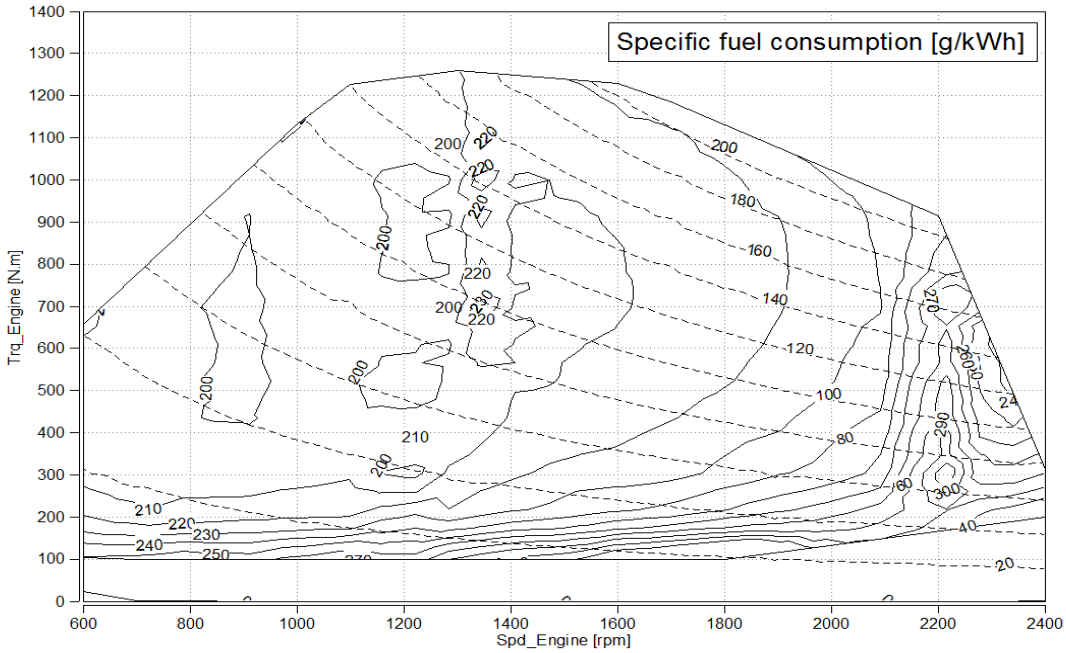

Nm
Maximum Engine Protection derate
800
700
600
500
400
300
200
100
0
500
1000
1500
2000
2500
Engine speed [rpm]
IFN Power 210 kW

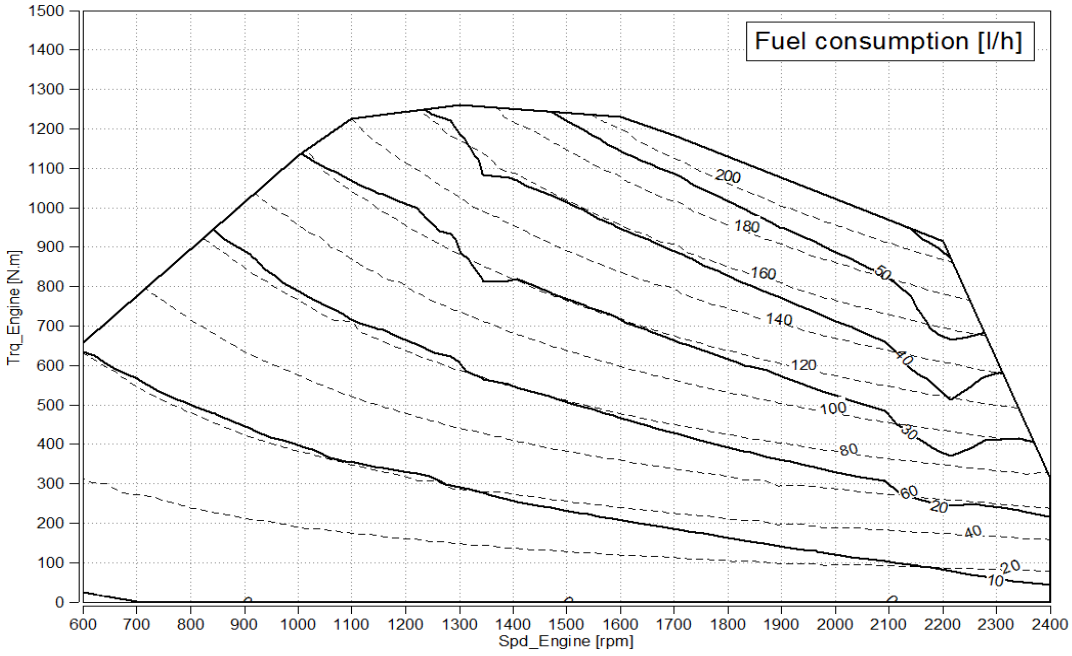


Maximum fan speed with visco clutch: 2400rpm



Maximum fan speed with visco clutch: 2400rpm


Specific fuel consumption [g/kWh]
Trq_Engine [N.m]
Spd_Engine [rpm]


Fuel consumption [l/h]
Trq_Engine [N.m]
Spd_Engine [rpm]